

DHIRENDRA N. GHOSH, FRSS
Statistical Consultant

Dhirendra N. Ghosh is a nationally recognized sampling expert and survey statistician. His more than 40 year statistical career encompasses all areas concerning statistical and methodological issues of survey design, estimation, and statistical analysis of survey data from complex surveys and time series analysis. Mr. Ghosh has served as a statistical consultant to a number of Government agencies, private firms, and other institutions. His experience includes more than 30 years of teaching sampling theory and mathematical statistics, with specialties in time series analysis and forecasting. Mr. Ghosh was trained at the Indian Statistical Institute under the legendary P.C. Mahalanobis and developed the sampling design and analysis procedures for India's National Sample Surveys under the guidance of D.B. Lahiri.

SUMMARY OF EXPERIENCE

- Expertise in all phases of survey research, including designing estimation, imputation, weighting, and quantitative analysis
- Times Series Analysis
- Expertise in application of analytical procedures to survey data
- Experienced in working with massive national databases

PROFESSIONAL EXPERIENCE

Synectics for Management Decisions, Inc.

1993 - present

Mr. Ghosh is a senior sampling statistician at Synectics. He brings to Synectics expertise in sampling design, estimation procedures, and data analysis techniques. Mr. Ghosh also has extensive experience in all phases of survey research, including design, imputation, weighting, and application of analytical procedures to survey data. He performs testing using such procedures as hierarchical linear models (HLM), loglinear models, and a variety of regression techniques.

During the past five years at Synectics, Mr. Ghosh has worked on most of the tasks involved with statistical and sampling issues. He played a major role in the Department of Education Employee Surveys of 1993 and 1996, the Generalized Variance Function study, the NCES Customer Satisfaction Surveys of 1996, 1997, and 1999, the National Study of Postsecondary Faculty (NSOPF) methodological study, and the evaluation of several variance calculating packages. He was also part of a team that examined issues of nonresponse in the Schools and Staffing Survey

Mr. Ghosh has worked on several projects for the Defense Manpower Data Center (DMDC). He created the sampling and weighting plan for the 1997 Survey of Spouses of Enlisted Personnel and wrote the methodology section of the report on that survey. Other DMDC projects involved such techniques as formation of weighting classes, estimation in longitudinal surveys, designing future surveys of defense personnel separating from the military, and developing data collection strategies from overseas defense personnel.

He co-conducted a highly successful seminar on Logistic Regression using NELS:88 data for the NCES University in March 1995. The other presenter was Dr. David Hosmer of the University of Massachusetts. For a task on Determination of Optimum Periodicity, he developed several probable error models and co-authored papers presented at the annual meetings of the American Statistical Association (ASA) in 1994, 1995, and 1996.

ADAMHA and SAMHSA**1985 - present**

Mr. Ghosh has had three contracts (purchase orders) from the Survey and Report Branch of NIMH (ADAMHA) and now the Substance Abuse and Mental Health Services Administration (SAMHSA). The first examined seasonality and duplication effects in Patient Survey Sample of Admissions to Mental Health Facilities. The second contract concerned imputation procedures for the 1990 Client Sample Survey of Outpatient Programs. The third contract was for the implementation of imputation procedures for the 1990 Client Sample Survey of Outpatient Programs and for a review of the 1996 Client/Patient Survey.

QSOF, Inc.**1991 - 1992**

Mr. Ghosh was a senior statistician for QSOF, Inc., in charge of Quality Control for a major project addressing the ongoing computerization of housing data for the U.S. Department of Housing and Urban Development.

EPA**1989 - 1990**

Mr. Ghosh worked as a statistical adviser, a sampling expert, to the Statistical Policy Branch (half-time). He was EPA's in-house consultant on all aspects of its major sample surveys.

Pragmatics, Inc.**1987 - 1989**

For three years, Mr. Ghosh worked on a project developing a statistical strategy for estimating error in Medicare payments. He was a senior statistician.

SAIC**1984 - 1986**

As a senior statistician, Mr. Ghosh developed research design and analysis procedures for a U.S. Air Force Agent Orange study.

Dynamac International**1984 - 1986**

Mr. Ghosh was employed as a senior biostatistician working in-house for EPA's Hazard Division on Risk Assessment. He developed statistical techniques and programs for the evaluation of reproduction and teratology studies. He also constructed the sampling design for the market basket survey for Alar.

JWK International**1980 - 1984**

For four years, Mr. Ghosh did statistical work on a project developing the sampling design and quality control procedures for NHTSA's National Accident Sampling Systems.

Human Sciences Research**1975 - 1980**

Mr. Ghosh developed the sampling survey design and estimation procedures for several studies on race relations for the U.S. Army. He developed the complemented survey technique for the National-Marine Fisheries Services' on-going National Recreational Fishing Survey, and also the National Fishing and Hunting Survey (see list of major projects).

Howard University**1962 - 1985**

Mr. Ghosh was associated with the Department of Community Health and Practice, College of Medicine, Howard University, where he worked as a biostatistician on numerous projects (see list of major projects). He also taught statistics in the Department of Mathematics from 1969 to 1978, and biostatistics to medical and nursing students from 1971 to 1985. Besides lecturing, Mr. Ghosh also had extensive involvement in statistical research at Howard University Medical School and Hospital. He helped *factor analyze* the large medical acceptance data collected by the Medical school. He was involved in all phases of managing very large databases.

Catholic University**1960 - 1969**

In the Statistical Lab, Mr. Ghosh provided statistical advice to university students and faculty members on statistical theory and methods applicable to their research projects.

MAJOR PROJECTS

Mr. Ghosh has served as a statistical consultant in the United States for more than 35 years. Some examples of his work are shown below:

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| 1995-1996 | "Comparative Analysis of JTPA Title III Retraining Outcomes." Solutron, Inc. (Department of Labor). |
| 1992-1993 | "Developing Sampling Weights for Surveys by the National Center for Health Statistics." Orkand Corporation. |
| 1991-1992 | "Degree of Automation in the States for the Food and Nutrition Service, USDA." Orkand Corporation. |
| 1987-1990 | "Economic Index for Small-Scale Business, Comprehensive Accounting Corporation." Developed a National Economic Index for Small Business (involved a major record linkage project). |
| 1986-1988 | "Multifamily Tenant Certification System." U.S. Department of Housing and Urban Development. Social and Scientific Systems. |
| 1985-1987 | "Magnitude Estimates" of incentives for Army recruits. Rumson Corporation, Army Research Institute. |

- 1983-1984 "Develop a Conventional Probability Sample Design for Petroleum Products." EIA, Department of Energy, JWK International.
- 1980-1983 "Develop the Sampling Design for the National Accident Sampling System." DOT, JWK International (Project Director).
- 1981 "Validation of Selected Coal Energy Information Systems." Department of Energy, Management Engineers, Inc.
- 1980-1981 "Industry Assessment of Uniform Hospital Billing." HCFA SysteMetrics Inc.
- 1980-1981 "Study of Clinic Case Management for United Mine Workers." NCHSR SysteMetrics Inc.
- 1979-1980 "National Farmworkers' Housing Survey." U.S.D.A. Inter-America Research Associates.
- 1979-1980 "Develop Alternate Approaches for the 1980 Survey of Hunting and Fishing: Fish and Wildlife Service." Human Sciences Research, Inc. (Author of Final Report).
- 1978 "Nationwide Survey of Collection and Transfusion of Blood." American Blood Commission.
- 1978 "Marine Recreational Fishing Survey" (Nationwide survey). NMFS.
- 1977-1978 "Nationwide Survey of Farmers and Their Attitude to Crop Insurance." Actuarial Research Corporation. Department of Agriculture.
- 1976-1978 "Methodology for Marine Recreational Fishing Surveys" (Nationwide). National Marine Fisheries Service. Human Sciences Research, Inc. (Co-author of Final Report).
- 1976-1977 "Hypertension." NIH. Howard University College of Medicine.
- 1974-1975 "Promotion of Telephone Operations." AT&T.
- 1973-1974 "Planning a National Center for Continuing Education for Librarians" (Nationwide survey). National Commission on Libraries, Catholic University of America.
- 1969-1973 "Alcoholism" (Survey in university campuses on East Coast, U.S.). NIMH. Howard University College of Medicine, 1969-1973.
- 1972 "Study of Lead-Based Paint Poisoning Programs in U.S." (Nationwide survey). Division of Health Evaluation, HEW. Bio-Dynamics, Inc., 1972.
- 1972 "Impact of Medicaid Management Information System." HEW. Bascomb Associates.

1969-1971 "Study of Professional Librarians" (Nationwide survey). Federal Library Committee, Catholic University of America.

TEACHING EXPERIENCE

Mr. Ghosh has taught sampling theory, mathematical statistics, and biostatistics at the following locations: Catholic University (1960-1969 and 1987-1990), Howard University Department of Mathematics (1969-1979), Howard University Medical School (1973-1984), U.S. Census Bureau (1980-1981), Graduate Research and Training School at the Indian Statistical Institute (1957-1960), International Statistical Educational Center in Calcutta (run jointly by the International Statistical Institute and UNESCO) (1957-1960). He has presented short courses on Sample Surveys around the nation (1978-1984), including one at the Bureau of Labor Statistics, and presented a two-day seminar on Logistic Regression (jointly, 1995).

EDUCATION

Mr. Ghosh completed all requirements toward a Ph.D. in Mathematical Statistics except dissertation at the Catholic University of America. He received a Master of Arts degree in Mathematics (1962) from the Catholic University of America (his M.A. dissertation, "Non-Linear Programming," was included in Saaty and Bram's *Nonlinear Mathematics*, now a Dover publication) and a Master of Science degree in Statistics (1954) from the University of Calcutta. His Bachelor of Science degree was in Mathematics Honours (1952).

PROFESSIONAL AFFILIATIONS

Mr. Ghosh is a member of the American Statistical Association, the Washington Statistical Society, and International Association of Survey Statisticians (International Statistical Institute). He is a Fellow of the Royal Statistical Society.

SELECTED PUBLICATIONS AND PRESENTATIONS

Papers appearing in the *Proceedings of the Section on Survey Research Methods*, American Statistical Association:

- "Behavior as a Motivational Indicator: A Statistical Methodology," 1999**
- "A Modification of Poisson Sampling," 1999*
- "Rectification of Sample Sizes in Bernoulli and Poisson Sampling," 1998*
- "Optimality in Balanced Rotating Panel Survey Design," 1997*
- "Alternate Loss Functions and Sample Sizes," 1996*
- "Optimal Periodicity of a Survey: Extension of Probable Error Models," 1996
- "Allocation Revisited," 1995*
- "Optimal Periodicity of a Survey: Alternatives under Cost and Policy Constraints," 1995
- "Optimal Periodicity of a Survey: Sampling Error, Data Deterioration, and Cost," 1994
- "Some Theorems Relating Post-Stratification and Sample Configuration," 1993*

* Co-authored with Andrew Vogt.

** Co-authored with Daniel Nooter.

- "Sample Configurations and Conditional Variance in Post-Stratification," 1988*
- "On the Sample Size Determination for Multiple Variable Sample Surveys," 1986
- "Estimation from Capture Alone: How to Estimate the Total Number of Illegal Immigrants," 1985
- "Improving the Plus One Method of Random Digit Dialing," 1984
- "Determining the Sample Size for Multivariate Estimates Satisfying Simultaneous Confidence Intervals," 1983
- "A Recall Experiment: The Impact of Time on Recall of Recreational Fishing Trip," 1982
- "Sampling Design for Marine Recreational Fishing Survey: An Example of a Complemented Survey," 1981
- Optional Reference Period for Discrete Events," 1978

Ghosh, D. and Vogt, A. (1999). *A Fixed Sampled Size Variant of Poisson Sampling* (to be presented at the 52nd session of the International Statistical Institute, Helsinki, Finland).

Ghosh, D. and Vogt, A. (1997). An Algorithm for Sampling on Surfaces. *Bulletin of the International Statistical Institute*, 51st session contributed papers, Tome LVII, Book 1, pp. 629-630.

Ghosh, D. (1979). On the Selective Nature of Bias, *Public Opinion Quarterly*, 43.

Ghosh, D. (co-author). (1977). *Blood Pressure and Socioeconomic Status in Black Adolescents*. Paper presented at the annual meeting of the Society for Adolescent Medicine, Atlanta, GA.